Department of Energy
Richland Operations Office
P.O. Box 550
Richland, Washington 99352

0039877

JAN 09 1994

95-PCA-113

Mr. Steve M. Alexander
Perimeter Area Section Manager
Nuclear Waste Section
State of Washington
Department of Ecology
P.O. Box 1386, MSIN N1-05
Richland, Washington 99352

Dear Mr. Alexander:

UNDERGROUND STORAGE TANK (UST) 1171-5 CLOSURE FORM, SITE ASSESSMENT REPORT, AND ACTIVE TANK PERMIT

Enclosed is the UST Closure Form, UST Site Check/Site Assessment Checklist, and the Active Tank Permit associated with the closure and removal of UST 1171-5. UST 1171-5 stored used oil inside the 1171 Building, which is located within the 1100 Area of the Hanford Site. The UST Closure Form, UST Site Check/Site Assessment of Checklist, and Active Tank Permits are being submitted pursuant to Washington Administrative Code 173-360-385(5).

On October 21, 1994, removal of Petroleum UST 1171-5 commenced under Project L-044, Hanford Infrastructure UST. Petroleum contaminated soil was encountered as a result of previous overfilling practices. Most of the petroleum contaminated soil was excavated at a depth of 13 feet. There are still pockets of petroleum contaminated soil next to the 1171 Building foundation. However, removal of the remaining petroleum contaminated soil could result in collapsing the west end of the 1171 Building. As noted in Assessment Report. Ecology has concurred with leaving the remaining petroleum contaminated soil in place.

Should you have any questions, please contact me, or Mr. H. M. Rodriguez, of my staff on (509) 376-6421.

Sincerely,

James D. Rasmussen, Acting Program Manager
Office of Environmental Assurance,
Permits, and Policy

EAP:HMR

Enclosures

cc w/encls:
EDMC, WHC
T. Wooley, Ecology

cc w/o encls:
W. T. Dixon, WHC
J. S. Hill, WHC
J. J. Luke, WHC

Underground Storage Tank Permit
Washington Department of Ecology
Please Display at the Underground Storage Tank Site.

VALIDATED BY
DEPARTMENT OF ECOLOGY
JUNE 9, 1994
EXPIRES
JUNE 30, 1995

SITE NUMBER: 012763
INVOICE NUMBER: UST49781
RICHLAND OPERATIONS
825 JADWIN, ATTN A. ~~RODREGUEZ~~ Rodriguez
PO BOX 550
RICHLAND, WA 99352-3562

If this permit should be sent to an address that is different from the owner's, please place a correctly addressed mailing label over the address shown below.

Owner:
U0087159
US DEPT OF ENERGY RICHLAND OPERATION
825 JADWIN AVE
PO BOX 550
RICHLAND, WA 99352-3562

Tank ID:
1171-5

Substance Stored:
USED OIL/WASTE OIL
This space provided for owner to identify this tank to product distributor.

ECY 010-165
Rev. 2/94

UNDERGROUND STORAGE TANK
Site Check/Site Assessment Checklist

WASHINGTON STATE DEPARTMENT OF ECOLOGY

For Office Use Only
Owner # _____
Site # _____

INSTRUCTIONS:

When a release has **not** been confirmed and reported, this Site Check/Site Assessment Checklist must be completed and signed by a person registered with the Department of Ecology. **The results of the site check or site assessment must be included with this checklist.** This form must be submitted to Ecology at the address shown below within 30 days after completion of the site check/site assessment.

SITE INFORMATION: Include the Ecology site ID number if the tanks are registered with Ecology. This number may be found on the tank owner's invoice or tank permit.

TANK INFORMATION: Please list all the tanks for which the site check and site assessment is being conducted. Use the tank ID number if available, and indicate tank capacity and substance stored.

REASON FOR CONDUCTING SITE CHECK/SITE ASSESSMENT: Please check the appropriate item.

CHECKLIST: Please initial each item in the appropriate box.

SITE ASSESSOR INFORMATION: This form must be signed by the registered site assessor who is responsible for conducting the site check/ site assessment.

Underground Storage Tank Section
Department of Ecology
P. O. Box 47655
Olympia, WA 98504-7655

SITE INFORMATION

Site ID Number (on invoice or available from Ecology if the tanks are registered): 012763

Site/Business Name: Richland Operations

Site Address: 825 Jadwin Ave. (Street) Telephone: (509) 376-5441

Richland (City) WA (State) 99352-3562 (ZIP Code)

TANK INFORMATION

Tank ID No.	Tank Capacity	Substance Stored
~~1171-6~~	~~1,500 Gal.~~	~~G - Used Oil~~
~~1171-4~~	~~1,000 Gal.~~	~~G - Used Oil~~
1171-5	2,000 Gal	G - Used Oil

REASON FOR CONDUCTING SITE CHECK/SITE ASSESSMENT

Check one:

- ____ Investigate suspected release due to on-site environmental contamination.
- ____ Investigate suspected release due to off-site environmental contamination.
- ____ Extend temporary closure of UST system for more than 12 months.
- ____ UST system undergoing change-in-service.
- ____ UST system permanently closed-in-place.
- X UST system permanently closed with tank removed.
- ____ Abandoned tank containing product.
- ____ Required by Ecology or delegated agency for UST system closed before 12/22/88.
- ____ Other (describe): _____

WASHINGTON STATE DEPARTMENT OF ECOLOGY

UNDERGROUND STORAGE TANK TEMPORARY/PERMANENT CLOSURE and SITE ASSESSMENT NOTICE

See back of form for instructions
Please ☑ the appropriate box(es)
Please type or print information

For Office Use Only
Owner #
Site #

[ ] Temporary Tank Closure [X] Permanent Tank Closure [ ] Change-In-Service [X] Site Assessment/ Site Check

SITE INFORMATION:

Site ID Number (on invoice or available from Ecology if the tanks are registered): 012763

Site/Business Name: Richland Operations

Site Address: 825 Jadwin Ave. (Street) Telephone: (509) 376-5441

Richland (City) WA (State) 99352-3562 (ZIP-Code)

TANK INFORMATION:

Tank ID	Closure Date	Tank Capacity	Substance Stored
~~1171-6~~	VR	~~1,500 Gal.~~	~~G - Used Oil~~
~~1171-4~~	VR	~~1,000 Gal.~~	~~G - Used Oil~~
1171-5		2,000 Gal.	G - Used Oil

CONTAMINATION PRESENT AT THE TIME OF CLOSURE

[X] Yes [ ] No

[ ] Unknown

Check unknown if no obvious contamination was observed and sample results have not yet been received from analytical lab.

UST SYSTEM OWNER/OPERATOR:

UST Owner/Operator: US Department of Energy Richland Operations

Owners Signature: Telephone: ( )

Address: 825 Jadwin Ave. (Street) 550 (P.O. Box)

Richland (City) WA (State) 99352-3562 (ZIP-Code)

TANK CLOSURE/CHANGE-IN-SERVICE PERFORMED BY:

Service Provider: ASRC Contracting Consultants Inc License Number: S002361

Licensed Supervisor: Sheldon Edmondson Decommissioning License Number: W002407

Supervisors Signature: Sheldon Edmondson

Address: 101 B. Wellsian #214 (Street) P.O. Box

Richland (City) WA (State) 99352 (ZIP-Code)

Telephone: (509) 276-772

SITE CHECK/SITE ASSESSMENT CONDUCTED BY:

Name of Registered Site Assessor: James K. Rouse

Telephone: (509) 946-6220

Address: 660 Swift Suite D (Street) P.O. Box

Richland (City) WA (State) 99352 (ZIP-Code)

ECY 020-34

UST CLOSURE/SITE ASSESSMENT FORM AND SITE CHARACTERIZATION REPORT

UST Site Owner:	U.S. Department of Energy, Richland Field Office
Owner's Address:	825 Jadwin, P.O. Box 550, Richland, WA 99352
Site ID Number:	012763
UST ID Number:	1171-5

Site Characterization Report for the United States Department of Energy Underground Storage Tank 1171-5

by

Bovay Northwest Inc.
660 Swift, Suite D
Richland, WA 99352

December 9, 1994

1.0 INTRODUCTION

This site characterization report provides information pertaining to the confirmation, characterization and excavation of petroleum-contaminated soil associated with the United States Department of Energy's (USDOE's) underground storage tank (UST) 1171-5 on the Hanford Site, Washington. Information contained in the report is intended to meet 90-day reporting requirements of the Washington State Department of Ecology (Ecology) Model Toxics Control Act Cleanup Regulation (MTCA) [WAC 173-340-450 (4) (b)].

Information contained in this report is based principally on site assessment activities which were performed by Bovay Northwest Inc. (Bovay) between October 21 and 31, 1994. Additional information includes general site observations during the excavation; removal of the tanks by ASRC Contracting Company, Inc. (ACCI); and a summary of analytical data from samples collected by Bovay which were analyzed by North Creek Analytical in Spokane, Washington. General owner oversight during the tank removal and assessment activities was performed by ICF Kaiser Engineers Hanford and Westinghouse Hanford Company. Photo-documentation of the tank removal and assessment activities located in Appendix A was performed by Bovay.

1.1 Reporting to Date

The following table summarizes reports issued to date, related to the closure of tank 1171-5.

Type of Report	Issued By	Issued To	Issue Date	Purpose
30-day Tank Closure Notice	Department of Energy	Department of Ecology	August 30, 1993	Inform Ecology of intent to close tanks.
24-hr Confirmed Release	Westinghouse Hanford Co.	Department of Ecology	October 24, 1994	Notify Ecology of Visual Indication of Contamination
72-hr Site Characterization Report	Department of Energy	Department of Ecology	October 27, 1994	More detail on confirmed release identified in 24-hr notification.

2.0 BACKGROUND AND SITE DESCRIPTION

This section includes information for tank 1171-5 and the surrounding site conditions and hydrogeologic setting.

2.1 Site Location

Tank 1171-5 is located adjacent to the 1171 Building in the 1100 Area on the Hanford Site, Washington (Figure 1). Figure 2 shows a more detailed location of the site including the location and orientation of the tank. The land area immediately west, south, and east of the subject site is comprised predominantly of equipment maintenance buildings and asphalt parking lots. The area north of the site contains a large, graded, gravel surface used as a parking lot for equipment and vehicles. The nearest residents to the 1171-5 site are approximately 2 miles to the southeast, near the city of Richland, Washington.

2.2 Tank System Description

Tank 1171-5 served as a waste oil storage tank for the 1171 maintenance building. The following table summarizes information on the tank:

Tank ID	Dates of Service	Tank Product at Closure	Nominal Tank Dimensions	Nominal Tank Capacity (gallons)	Tank Construction Material
1171-5	1953 - 1994	Waste Oil	6 ft diameter by 10 ft in length	2,000	Carbon Steel

2.3 Site Hydrogeologic Setting

Sediments encountered during the excavation of tank 1171-5 consisted of inter-layered sandy gravel (GP) and gravelly sand (SP) from ground surface to 12 ft. The southern portion of the excavation exhibited sandy gravel from ground surface to 1 ft, slightly gravelly sand from 1 ft to 4 ft, and sandy gravel from 4 ft to the limit of excavation. Sediments exposed in the northern portion of the excavation exhibited sandy gravel from ground surface to 4 ft, slightly gravelly sand from 4 ft to 6 ft, and gravelly sand from 6 ft to the limit of excavation. The lateral discontinuity of sediments between the northern and southern portions of the excavation are a result of excavation and backfilling associated with past UST installation and removal activities.

Field personnel noted visible contamination concentrated in a thin (1 in. to 3 in.) layer at the interface of the gravelly sand and the lower sandy gravel sediments at

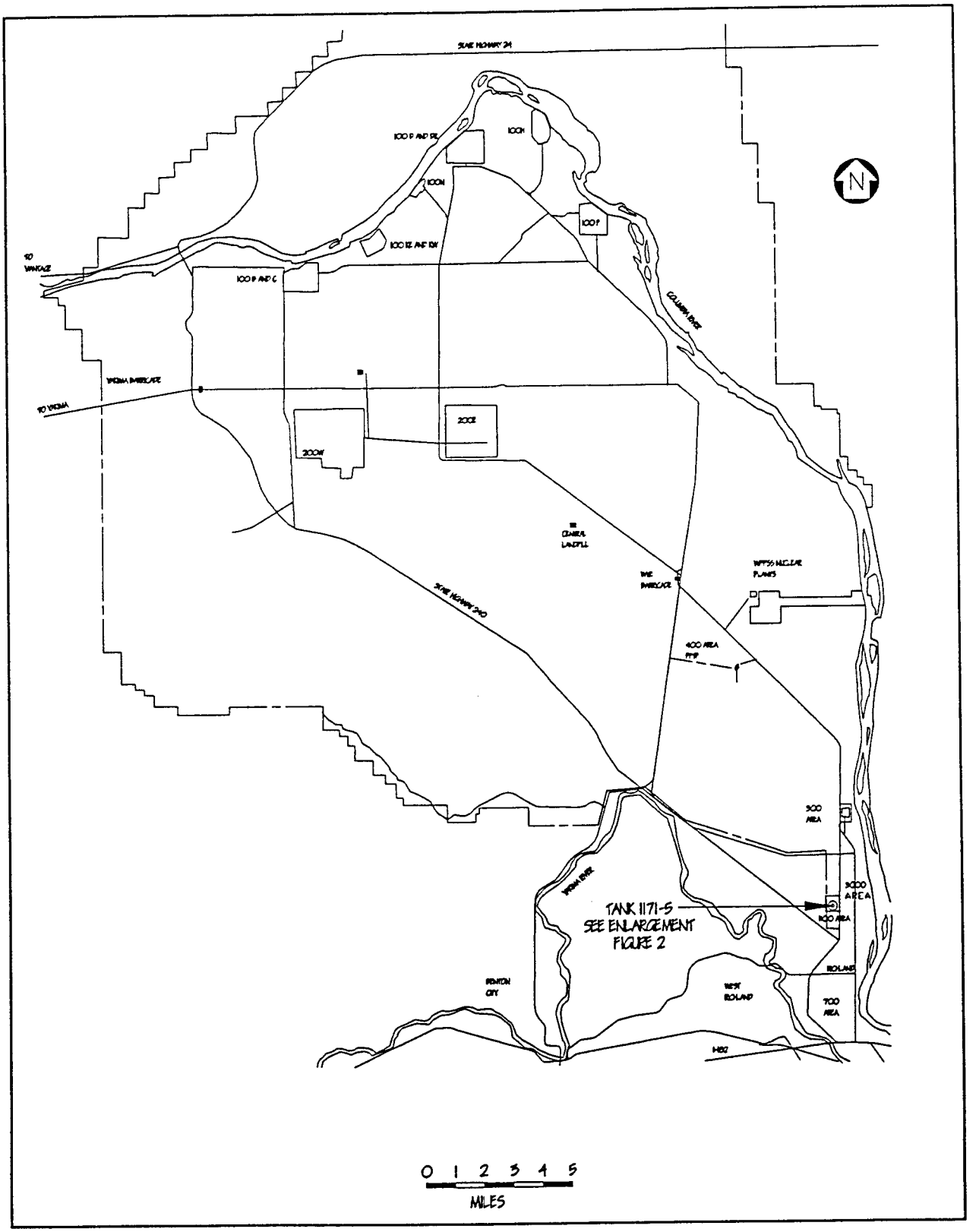

Figure 1 Hanford Site Map Showing the General Location of the 1171-5 UST.

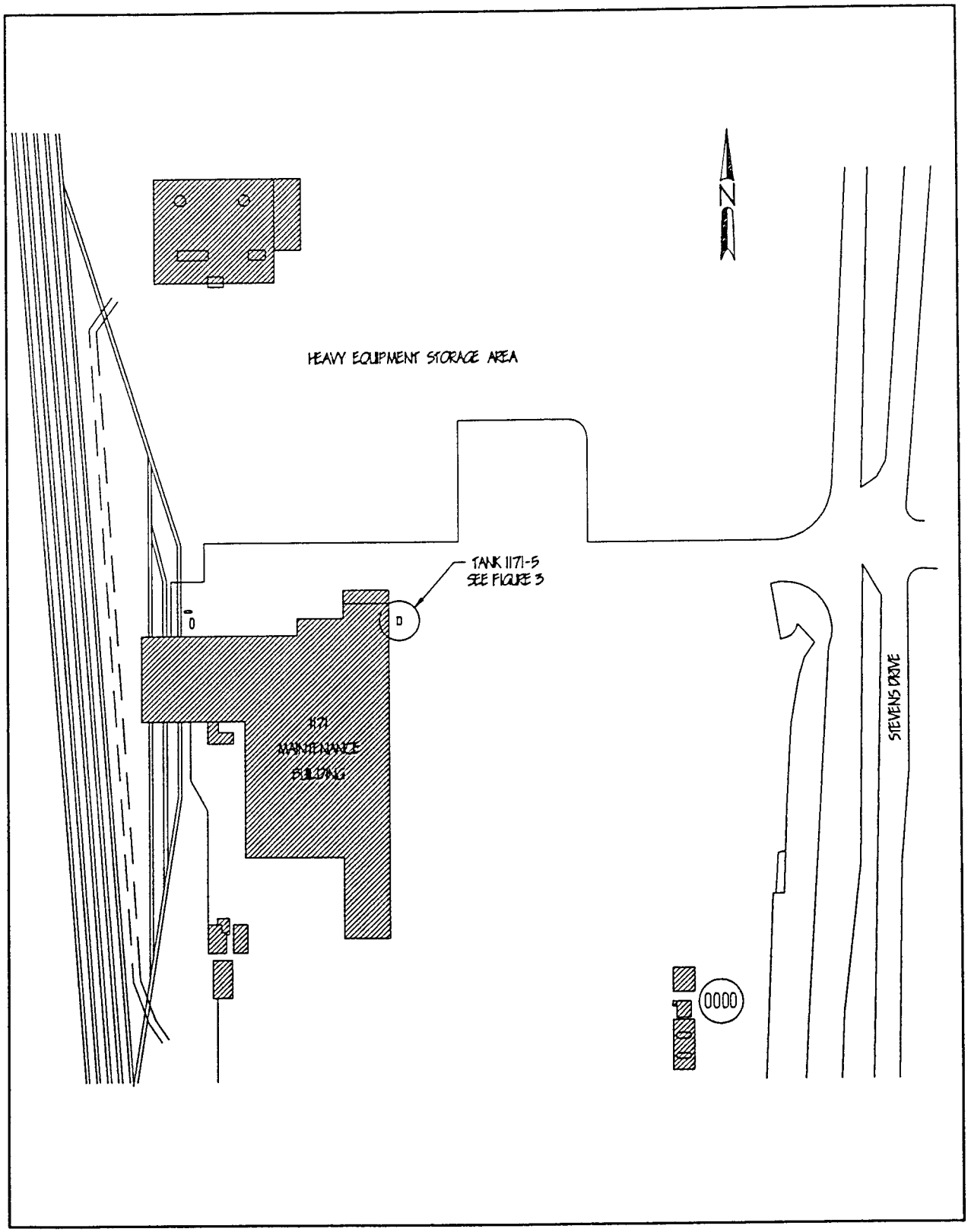

Figure 2 Map Showing Location of the 1171 Building and 1171-5 UST in the 1100 Area on the Hanford Site.

approximately 4 ft. below ground surface.

Soil moisture at the 1171 site ranged from 4.3% to 9.0%, which is typical of soil moisture observed in near-surface Hanford soils.

Depth to water in the area of the tank excavation is approximately 42 ft below ground surface. Since vertical contaminant migration appears to be limited to approximately 13 ft below ground surface, groundwater was not considered affected by the contaminant plume.

3.0 TANK DECOMMISSIONING ACTIVITIES

Prior to excavation of the 1171-5 tank, a site check revealed the following information:

- Surface contamination was found around the fill/pump-out pipe.
- The tank primarily received waste oil from the vehicle maintenance bay located approximately 10 ft to the west through a 3 inch pipeline.

Supervision and performance of tank decommissioning activities was executed by ACCI. The tank was decommissioned, removed and disposed of according to the following procedures.

1) A trackhoe was used to excavate to the top and side of the tank.

2) Once the top of the tank was exposed, all piping and fittings except the vent line were removed and pipe ends were capped. The carbon steel hold-down straps were also cut and removed at this time.

3) Residual waste oil and sludge in the tank was pumped out into segregated waste drums for disposal.

4) The headspace of the tank was checked to ensure that the lower explosive limit (LEL) was not exceeded. Two large holes were cut into the top of the tank to facilitate cleaning and also to render the tank unusable.

5) The tank was cleaned and rinsed out with a high pressure cleaner using a water and detergent solution. The wash and rinse water was pumped out of the tank into waste drums for disposal.

6) The vent line was disconnected and the tank was removed from the excavation with a trackhoe.

7) The tank was inspected for corrosion, holes or other evidence to indicate tank leakage. No sign of tank leakage was found, however, there was evidence of soil staining indicating that the tank was overfilled during its operational history.

8) The 2,000-gallon carbon steel tank was hauled off the Hanford Reservation and sold as scrap.

9) Both the north and south hold-down pads were abandoned in-place during backfilling of the excavation.

4.0 TANK EXCAVATION OBSERVATIONS

Tank 1171-5 contained waste oil and was located approximately 10 ft east of the northeast corner of the 1171 Maintenance Building. The length of the tank was oriented north-south. From October 21 to 26, 1994, the tank was decommissioned according to the procedure in Section 3.0. Field observations performed during and after tank removal indicated hydrocarbon contamination was present in the soil. From the pattern of contamination, it appeared that the tank was overfilled. Highly contaminated (stained black) soil was observed in a 3 ft. diameter cylinder around the fill pipe spreading down to the north end of the tank. This contamination then appeared to spread over the north portion of the tank, predominately on the northeast corner. Contaminated soil was also evident under the northeast corner of the south hold-down pad.

Excavation of contaminated soils was performed to the extent possible before and after tank 1171-5 was removed. Removal of contaminated soils was based on field observation methods (i.e., PID readings, odor, and visual observations). When these observations indicated contamination had been removed or minimized, soil samples were collected to confirm compliance with the WAC-173-340 Method A Cleanup Standards.

Ecology granted an exemption for pockets of contamination under the northeast corner of the south hold-down pad and next to the 1171 building foundation. Messrs. Ted Wooley and Bob Wilson of Ecology documented in a cc:mail message dated October 31, 1994 to Mr. Stan Hill of Westinghouse Hanford Company. The message stated that "...given the proximity of the building to the excavation the tank removal and subsequent cleanup is thus far compliant." Reasons for this decision were as follows:

- Further excavation (especially to the west) would compromise the structural integrity of the 1171 building. It was observed that when further excavation of contaminated soil was attempted, sediments beneath the building would collapse, resulting in undermining of the building foundation.

- Access to the contaminated soil under the hold-down pads was severely limited due to the size of the pads and the 4-inch electrical conduit that was directly above.

- It is not likely that the contamination would reach the water table since the source and majority of contamination had been removed.

- The asphalt surface planned for the site will act as a "surface cap" by inhibiting surface-water infiltration and resultant contamination mobilization.

Once the excavation was terminated, soil samples were collected from the distinct sedimentary layers along the west sidewall of the excavation. Some of these sample analyses showed hydrocarbon levels exceeding the WAC 173-340 Method A Cleanup Standards. Analytical results from the 1171-5 sampling activities are discussed in more detail in Section 5.0.

Excavation spoils were stockpiled into separate piles based on whether the soil was suspected clean or suspected contaminated. The contaminated spoils piles contained material with visible or detectable (using PID or odor) contamination. The contaminated spoils were transported to the contaminated storage cell located west of the 300 Area.

5.0 SAMPLING AND ASSESSMENT ACTIVITIES

Samples of the 1171-5 tank contents were collected on April 19, 1994 by ICF Kaiser Engineers Hanford personnel. These samples were analyzed for arsenic, barium, cadmium, chromium, lead, mercury, selenium, silver, polychlorinated biphenyls (PCBs), total organic halides, and flashpoint. Both the metals and PCB analysis showed results less then detection levels. Total halides and flashpoint results indicated 80 mg/L and 91°C, respectively. Analytes for the assessment sampling were based on analytical results from the tank contents sampling as well as operational history of the tank.

The analytical table in Appendix B summarizes the sample and analysis information for the tank excavation and assessment activities. Figure 3 shows the locations of samples collected during the assessment activities. Figure 4 shows a cross-sectional view of the excavation along with sample locations.

Sample collection was performed according to standard protocol discussed in Ecology's *Guidance for Site Checks and Site Assessments for Underground Storage Tanks, October 1992 revision.* Samples from the excavations were collected from the trackhoe bucket (Samples 1 through 10) or from a coring device (Samples 11 through 14) since personnel entry into the excavation was prohibited.

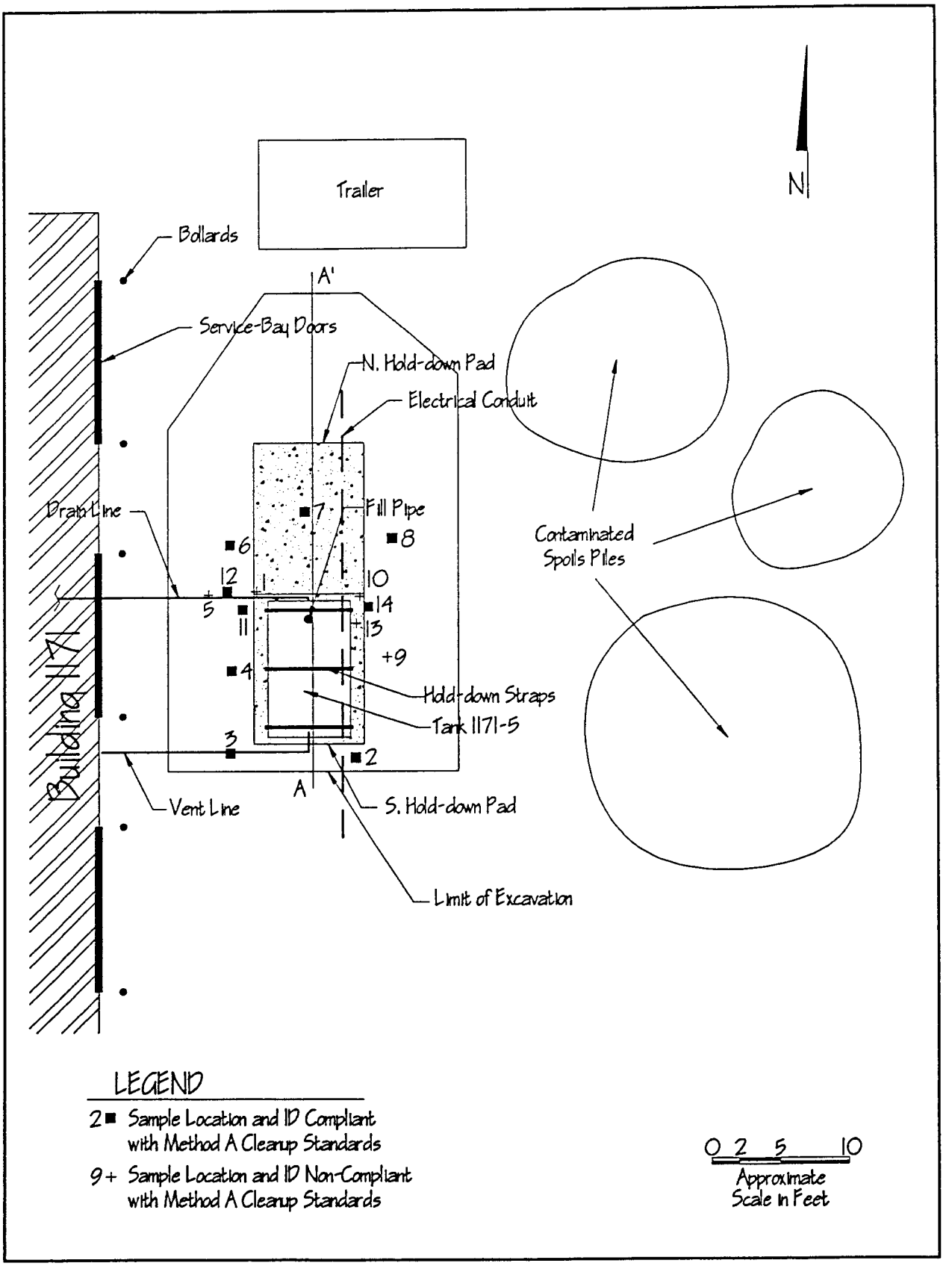

Figure 3 Site Map Showing Sample Locations Relative to Tank Locations and Limits of Excavation.

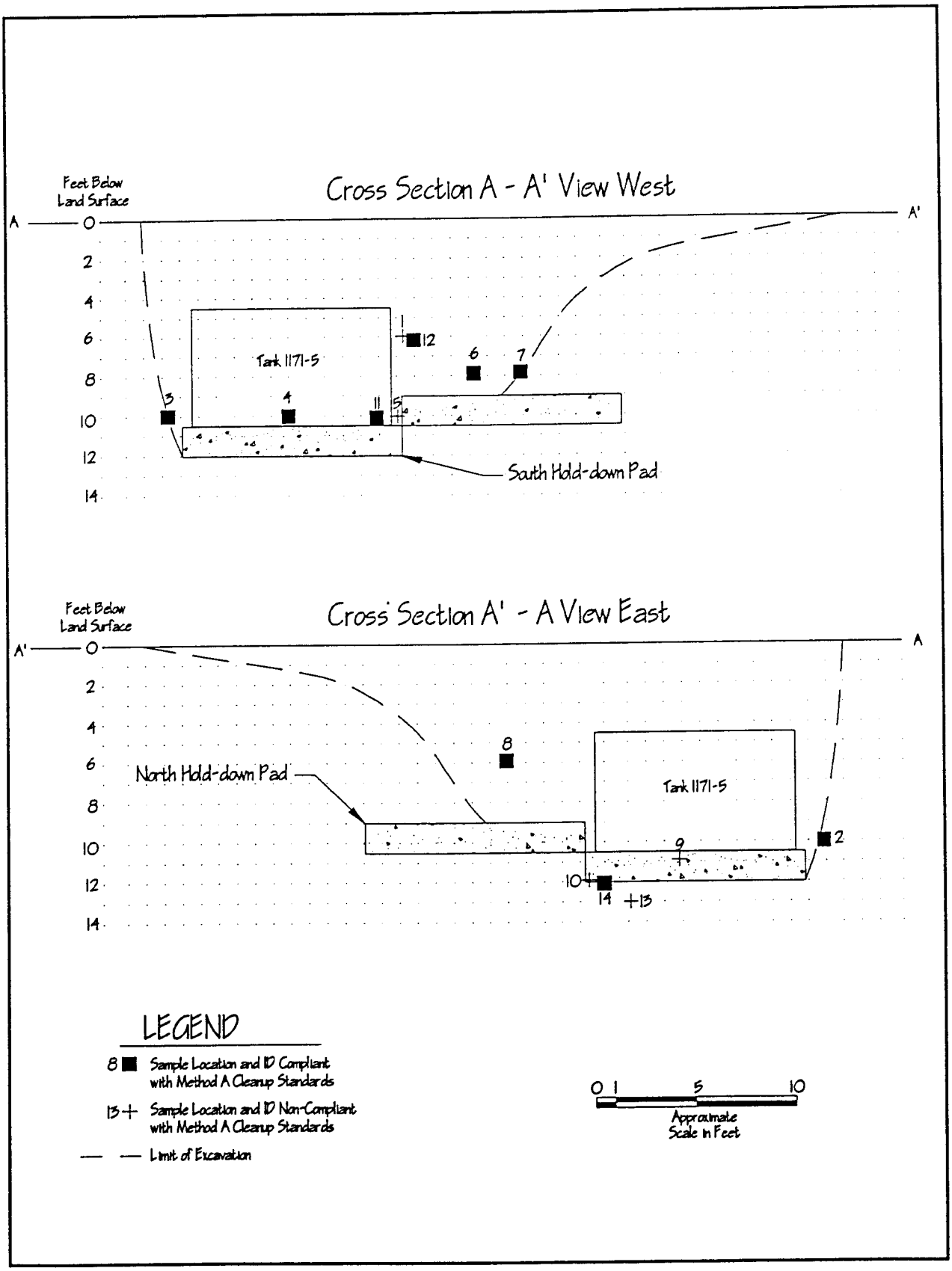

Figure 4 Cross Sectional Views of the 1171-5 UST Showing Sample Locations and Limits of Excavation.

All of the samples collected were analyzed using the WTPH-418.1 method to determine the presence of oil-range hydrocarbons. In addition, samples 1, 10, 11, and 13 were analyzed for arsenic, cadmium, chromium, and lead (using EPA Method 7420) and for halogenated hydrocarbons (using EPA Method 8010).

Copies of the analytical reports, laboratory QA/QC reports and chain-of-custody forms are located in Appendix C.

6.0 PLANNED REMEDIAL ACTIVITIES

Contaminated soils, which are currently being stored in a lined cell west of the 300 Area will be treated using aeration and biodegradation methods. Once the contaminated soils are treated to compliance with the Method A Cleanup Standards, a report documenting the treatment will be submitted to Ecology within 90 days of completing those actions.

APPENDIX A

Photos of 1171-5 Tank Removal Activities
and Excavation of Contaminated Soils

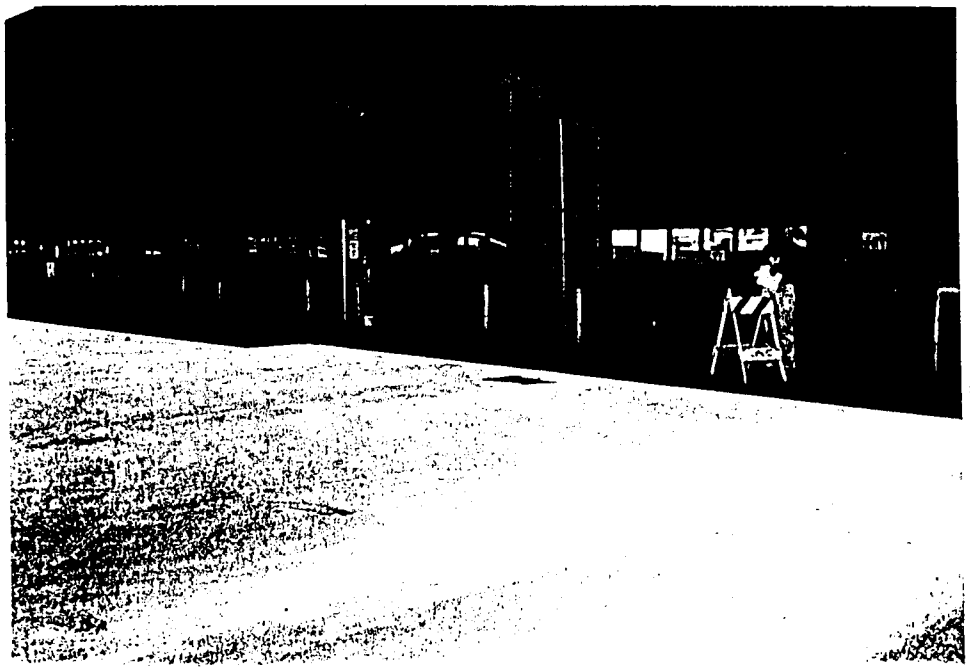

Photo 1: 1171-5 Site Prior to Excavation - View Southwest (June 9, 1994)

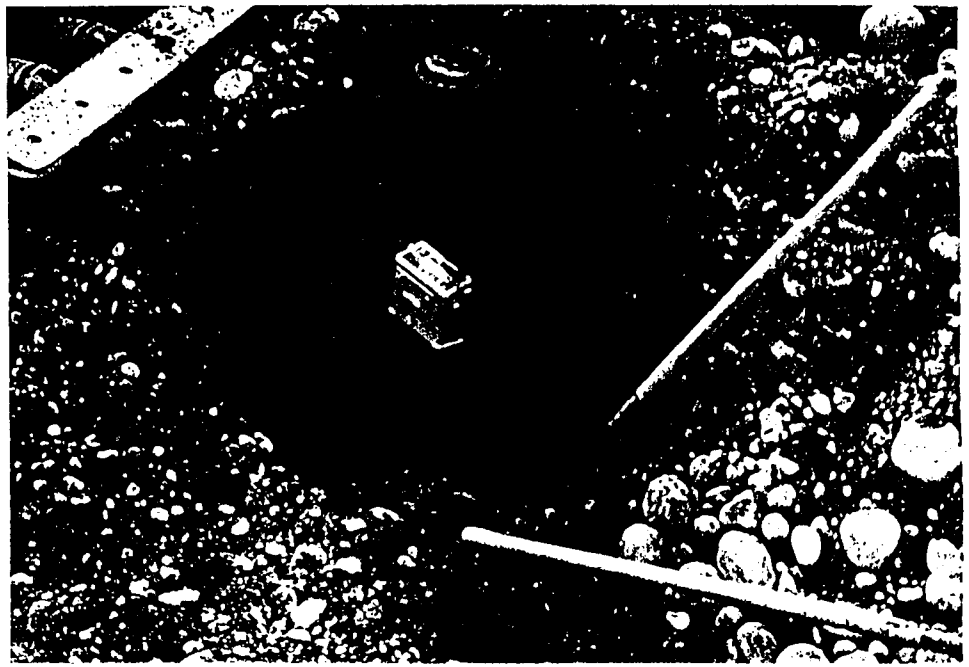

Photo 2: Excavation of Tank Feed/Pump-out Pipe - View East (October 21, 1994)

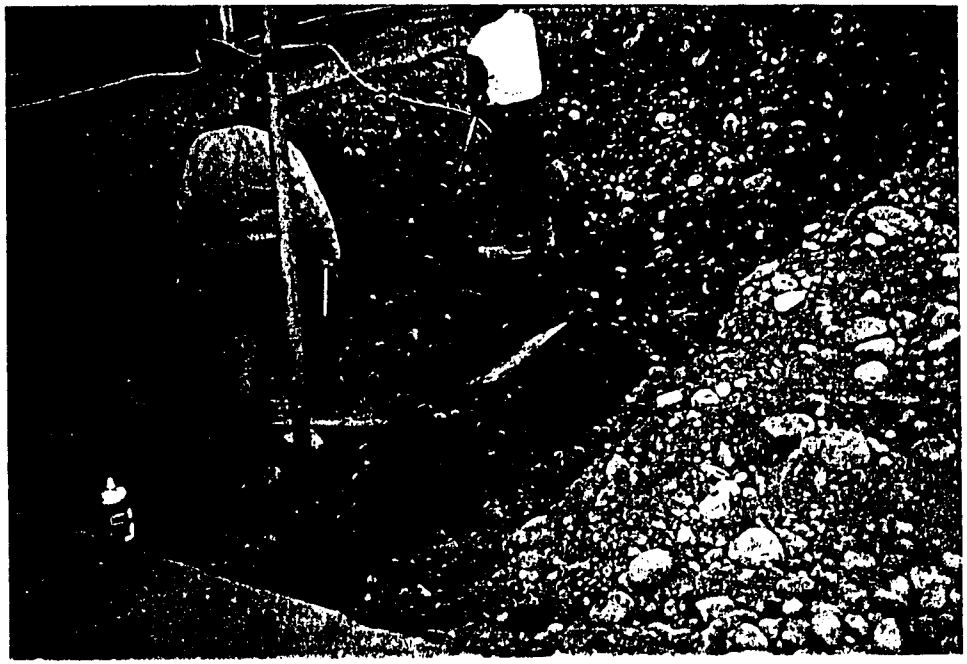

Photo 3: Top of 1171-5 Excavated - View Northwest (October 24, 1994)

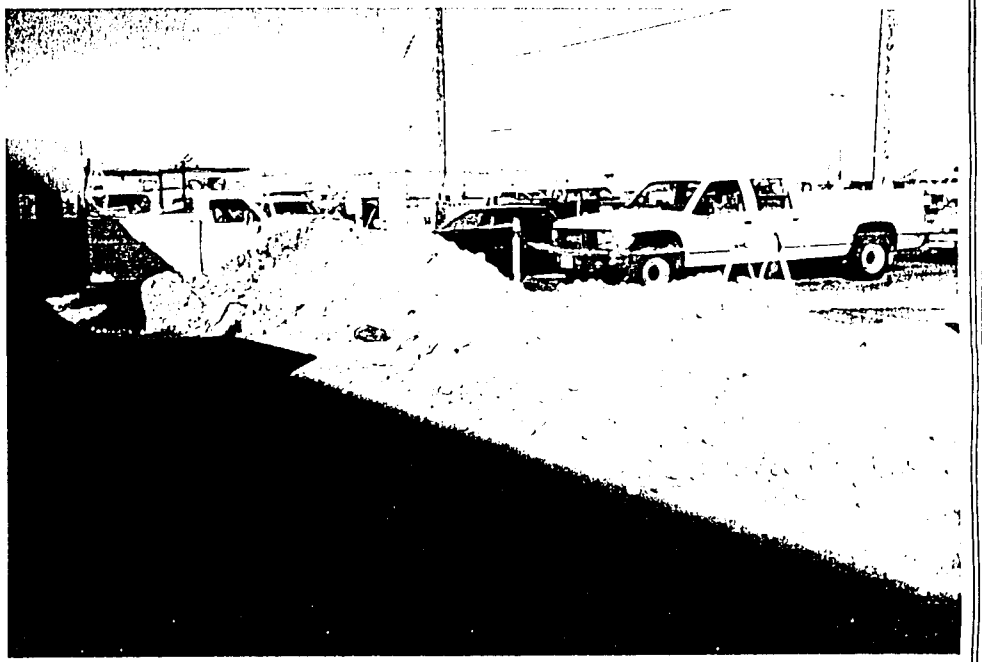

Photo 4: Spoils Piles - View Northeast (October 27, 1994)

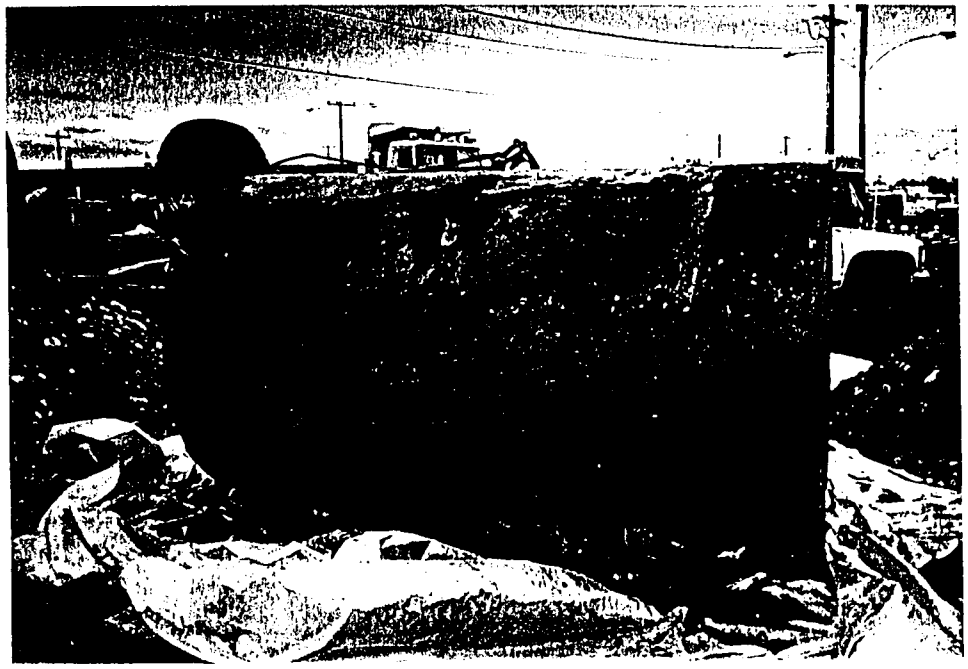

Photo 5: West Side of Tank 1171-5 - View Southeast (October 26, 1994)

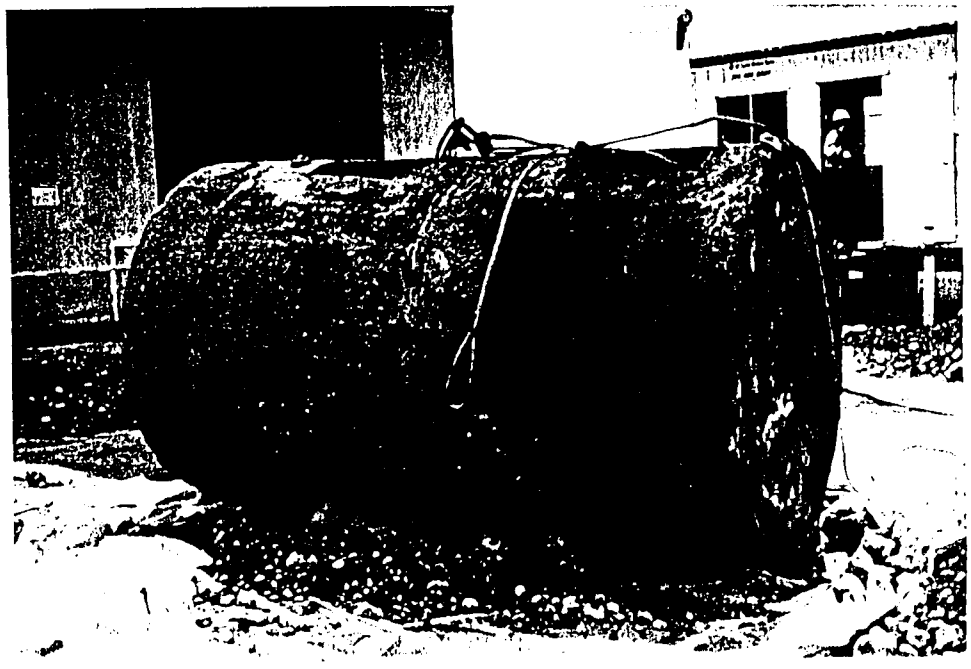

Photo 6: East Side of Tank 1171-5 - View Northwest (October 26, 1994)

Photo 7: Tank Hold-down Pads Exposed - View Northeast (October 27, 1994)

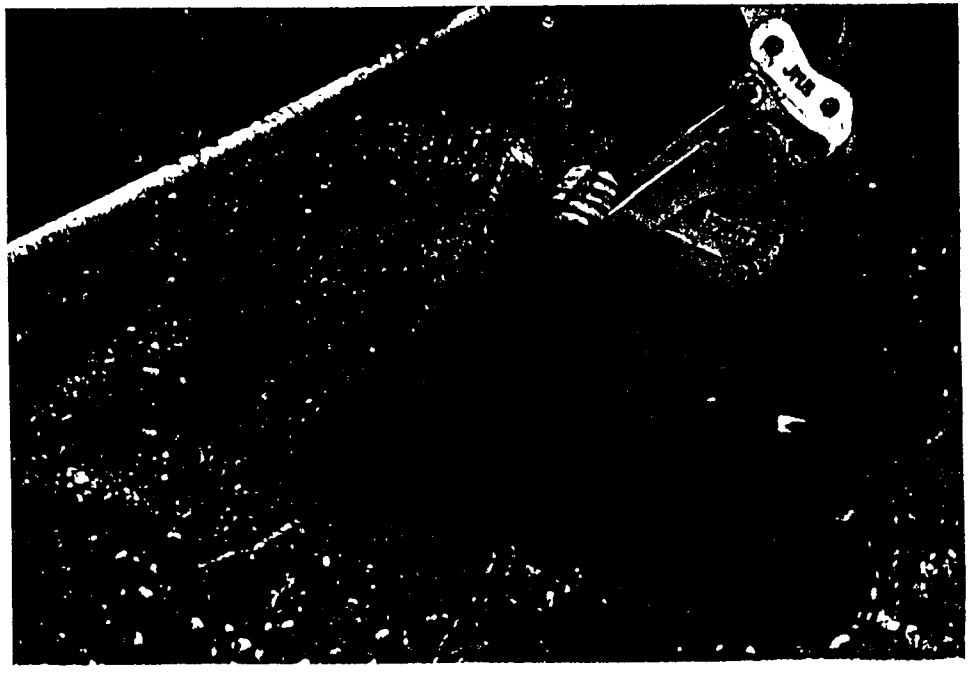

Photo 8: View Under the South Hold-down Pad - View Southeast (October 27, 1994)

Photo 9: Contaminated Area Under N.E. Corner of South Pad - View Northwest (October 31, 1994)

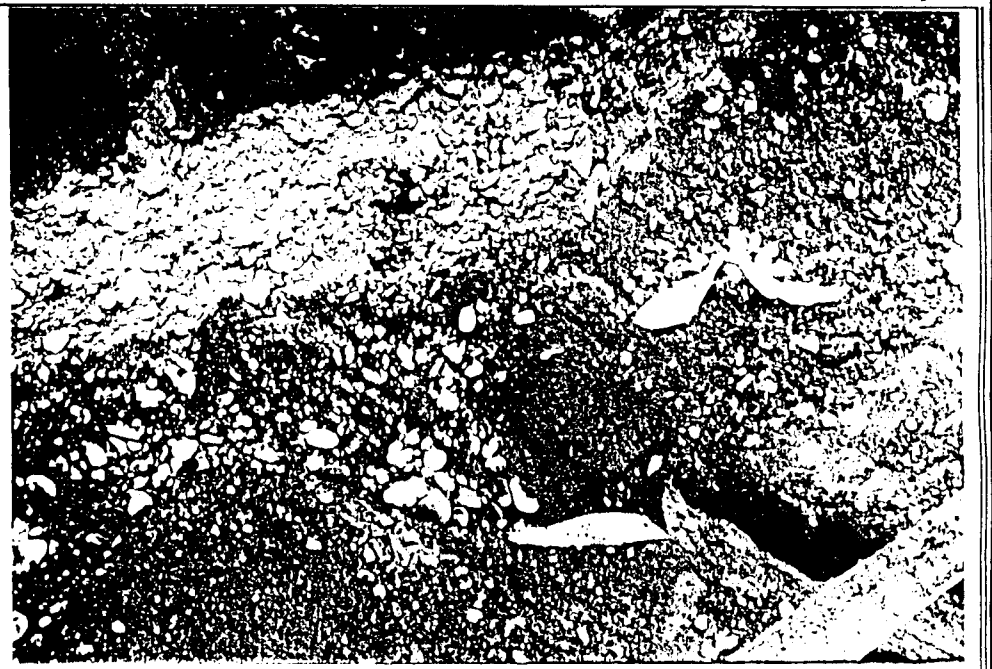

Photo 10: Contaminated Area Above N.W. Corner of South Pad - View Northwest (October 31, 1994)

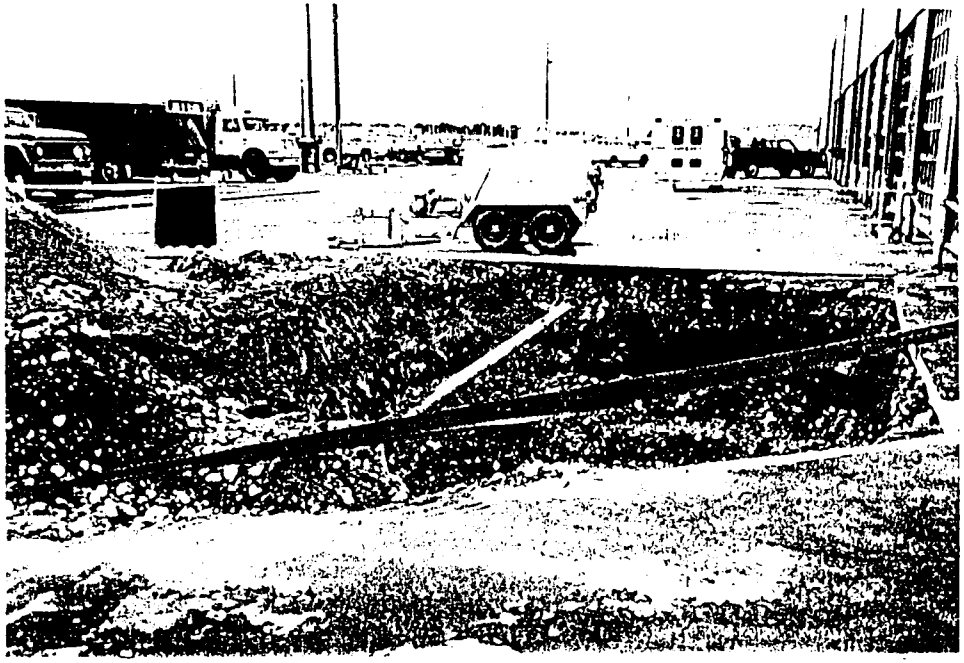

Photo 11: Final Tank Excavation - View Southeast (October 31, 1994)

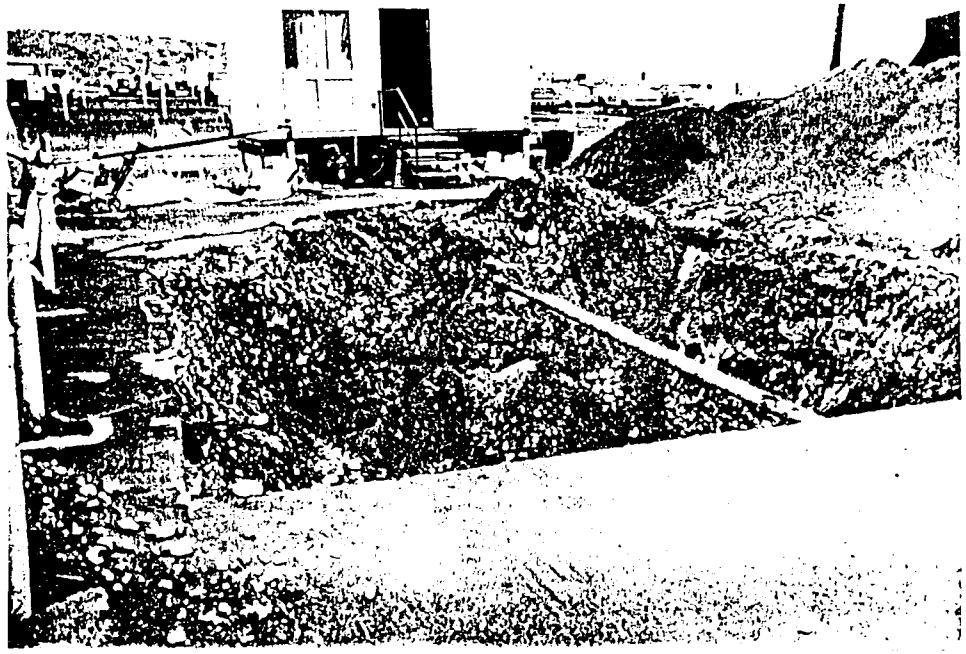

Photo 12: Final Tank Excavation - View Northeast (October 31, 1994)

APPENDIX B

Summary Table of Samples Collected During Tank Removal and Excavation Activities

Sample ID	Sample Location	Sample Depth (ft)	Sample Date (1994)	Oil-Range Hydrocarbons (mg/kg)	Metals Analysis (mg/kg)				Halogenated Volatile Organics (mg/kg)	% Soil Moisture
					Ar	Cd	Cr	Pb		
WAC 173-340 Method A Cleanup Standards for Soil				200	20	2	100	250	Compound Specific	- -
1171-5-1	Under Drain Pipe	6	October 24	9,700	<10	<0.25	5.1	7.8	0.62[1]	6.9
1171-5-2	S.E. Corner	10	October 27	<100	N/A				N/A	5.4
1171-5-3	S.W. Corner	10	October 27	200	N/A				N/A	5.4
1171-5-4	West Side	10	October 27	<100	N/A				N/A	7.4
1171-5-5	N.W. Corner	10	October 27	2,300	N/A				N/A	8.2
1171-5-6	N.W. Corner	8	October 27	180	N/A				N/A	7.7
1171-5-7	North Side	8	October 27	<100	N/A				N/A	6.6
1171-5-8	N.E. Corner	6	October 27	<100	N/A				N/A	7.6
1171-5-9	Bottom	11	October 27	5,500	N/A				N/A	6.7
1171-5-10	Bottom	12	October 28	14,000	<10	<0.25	3.6	<5.0	0.28[1]	9.0
1171-5-11	N.W. Corner	10	October 31	<100	<10	<0.25	5.5	<5.0	<0.05	5.5
1171-5-12[2]	N.W. Corner	6	October 31	Destroyed During Transport						
1171-5-13	Bottom	13	October 31	4,600	<10	<0.25	2.7	<5.0	<0.05	4.3
1171-5-14	Bottom	12	October 31	<100	N/A				N/A	6.1

[1] Tetrachloroethene (Cleanup Standards for Soil is 0.5 mg/kg)
[2] Destroyed During Transport

N/A Sample was not analyzed for these compounds.

APPENDIX C

NORTH CREEK ANALYTICAL

18939 120th Avenue N.E., Suite 101 • Bothell, WA 98011-9508 (206) 481-9200 • FAX 485-2992
East 11115 Montgomery, Suite B • Spokane, WA 99206-4776 (509) 924-9200 • FAX 924-9290
9405 S.W. Nimbus Avenue • Beaverton, OR 97008-7132 (503) 643-9200 • FAX 644-2202

Bovay Northwest Inc. - Richland	Client Project ID:	DOE - UST, 1641-031	Sampled:	Oct 27, 1994
660 Swift, Suite D	Sample Matrix:	Soil	Received:	Oct 27, 1994
Richland, WA 99352	Analysis Method:	WTPH-418.1 Modified	Extracted:	Oct. 27/31, 1994
Attention: Jim Rouse	First Sample #:	410-4618	Analyzed:	Oct. 27/31, 1994
			Reported:	Oct.27/Nov.1, 1994

TOTAL PETROLEUM HYDROCARBONS-OIL RANGE

Sample Number	Sample Description	Sample Result mg/kg (ppm)
410-4618	1171-5-1	9,700
410-4619	1171-5-2	N.D.
410-4620	1171-5-3	200
410-4621	1171-5-4	N.D.
410-4622	1171-5-5	2,300
410-4623	1171-5-6	180
410-4624	1171-5-7	N.D.
410-4669	1171-5-8	N.D.
410-4670	1171-5-9	5,500
BLK41028A	Method Blank	N.D.

Reporting Limit:	**100**

Analytes reported as N.D. were not detected above the stated Reporting Limit.
The results reported above are on a dry weight basis.

NORTH CREEK ANALYTICAL Inc.

Scott L. Armand
Laboratory Manager

4104618.BOR <2>

NORTH CREEK ANALYTICAL

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Bovay Northwest, Inc.	Client Project ID:	DOE-UST, #1641-031	Sampled:	Oct 28, 1994
808 East Sprague Avenue	Sample Matrix:	Soil	Received:	Nov 1, 1994
Spokane, WA 98202	Analysis Method:	WTPH-418.1 Modified	Extracted:	Nov 1, 1994
Attention: Nancy Lucas	First Sample #:	411-0001	Analyzed:	Nov 1, 1994
			Reported:	Nov 1, 1994

TOTAL PETROLEUM HYDROCARBONS-OIL RANGE

Sample Number	Sample Description	Sample Result mg/kg (ppm)
411-0001	#1171-5-10	14,000
BLK110194	Method Blank	N.D.

Reporting Limit:	**100**

Analytes reported as N.D. were not detected above the stated Reporting Limit.
The results reported above are on a dry weight basis.

NORTH CREEK ANALYTICAL Inc.

Laura Dutton
Project Manager

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Bovay Northwest Inc. - Richland	Client Project ID:	DOE-UST, #1641-031	Sampled:	Oct 31, 1994
660 Swift, Suite D	Sample Matrix:	Soil	Received:	Nov 1, 1994
Richland, WA 99352	Analysis Method:	WTPH-418.1 Modified	Extracted:	Nov 2, 1994
Attention: Jim Rouse	First Sample #:	411-4007	Analyzed:	Nov 2, 1994
			Reported:	Nov 2, 1994

TOTAL PETROLEUM HYDROCARBONS-OIL RANGE

Sample Number	Sample Description	Sample Result mg/kg (ppm)
411-4007	1171-5-11	N.D.
411-4008	1171-5-13	4,600
411-4009	1171-5-14	N.D.
BLK	Method Blank	N.D.

Reporting Limit:	**100**

Analytes reported as N.D. were not detected above the stated Reporting Limit.
The results reported above are on a dry weight basis.

NORTH CREEK ANALYTICAL Inc.

Scott L. Armand
Laboratory Manager

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Bovay Northwest Inc. - Richland	Client Project ID:	DOE - UST, 1641-031	Sampled:	Oct 27, 1994
660 Swift, Suite D	Sample Descript:	1171-5-1	Received:	Oct 27, 1994
Richland, WA 99352	Sample Matrix:	Soil	Digested:	Nov 1, 1994
Attention: Jim Rouse	Sample Number:	410-4618	Analyzed:	Nov 1, 1994
			Reported:	Nov 1, 1994

METALS ANALYSIS

Analyte	EPA Method	Reporting Limit mg/kg (ppm)	Sample Results mg/kg (ppm)
Arsenic	6010	10.0	N.D.
Cadmium	6010	0.25	N.D.
Chromium	6010	0.5	5.1
Lead	6010	5.0	7.8

Analytes reported as N.D. were not detected above the stated Reporting Limit.
The results reported above are on a dry weight basis.

NORTH CREEK ANALYTICAL Inc.

Scott L. Armand
Laboratory Manager

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Bovay Northwest, Inc.	Client Project ID:	DOE-UST, #1641-031	Sampled:	Oct 28, 1994
808 East Sprague Avenue	Sample Descript:	#1171-5-10	Received:	Nov 1, 1994
Spokane, WA 98202	Sample Matrix:	Soil	Digested:	Nov 1, 1994
Attention: Nancy Lucas	Sample Number:	411-0001	Analyzed:	Nov 1, 1994
			Reported:	Nov 1, 1994

METALS ANALYSIS

Analyte	EPA Method	Reporting Limit mg/kg (ppm)	Sample Results mg/kg (ppm)
Arsenic	6010	10	N.D.
Cadmium	6010	0.25	N.D.
Chromium	6010	0.50	3.6
Lead	6010	5.0	N.D.

Analytes reported as N.D. were not detected above the stated Reporting Limit.
The results reported above are on a dry weight basis.

NORTH CREEK ANALYTICAL Inc.

Laura Dutton
Project Manager

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Bovay Northwest Inc. - Richland	Client Project ID:	DOE-UST, #1641-031	Sampled:	Oct 31, 1994
660 Swift, Suite D	Sample Descript:	1171-5-11	Received:	Nov 1, 1994
Richland, WA 99352	Sample Matrix:	Soil	Digested:	Nov 2, 1994
Attention: Jim Rouse	Sample Number:	411-4007	Analyzed:	Nov 2, 1994
			Reported:	Nov 2, 1994

METALS ANALYSIS

Analyte	EPA Method	Reporting Limit mg/kg (ppm)	Sample Results mg/kg (ppm)
Arsenic	6010	10.0	N.D.
Cadmium	6010	0.25	N.D.
Chromium	6010	0.5	5.5
Lead	6010	5.0	N.D.

Analytes reported as N.D. were not detected above the stated Reporting Limit.
The results reported above are on a dry weight basis.

NORTH CREEK ANALYTICAL Inc.

Scott L. Armand
Laboratory Manager

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Bovay Northwest Inc. - Richland	Client Project ID:	DOE-UST, #1641-031	Sampled:	Oct 31, 1994
660 Swift, Suite D	Sample Descript:	1171-5-13	Received:	Nov 1, 1994
Richland, WA 99352	Sample Matrix:	Soil	Digested:	Nov 2, 1994
Attention: Jim Rouse	Sample Number:	411-4008	Analyzed:	Nov 2, 1994
			Reported:	Nov 2, 1994

METALS ANALYSIS

Analyte	EPA Method	Reporting Limit mg/kg (ppm)	Sample Results mg/kg (ppm)
Arsenic	6010	10.0	N.D.
Cadmium	6010	0.25	N.D.
Chromium	**6010**	**0.5**	**2.7**
Lead	6010	5.0	N.D.

Analytes reported as N.D. were not detected above the stated Reporting Limit.
The results reported above are on a dry weight basis.

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Scott L. Armand
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Bovay Northwest Inc. - Richland	Client Project ID:	DOE - UST, 1641-031	Sampled:	Oct 24, 1994
660 Swift, Suite D	Sample Descript:	Soil, 1171-5-1	Received:	Oct 27, 1994
Richland, WA 99352	Analysis Method:	EPA 8010	Analyzed:	Oct 31, 1994
Attention: Jim Rouse	Sample Number:	410-4618	Reported:	Nov 1, 1994

HALOGENATED VOLATILE ORGANICS

Analyte	Reporting Limit mg/kg (ppm)	Sample Results mg/kg (ppm)
Bromodichloromethane	0.050	N.D.
Bromoform	0.050	N.D.
Bromomethane	0.050	N.D.
Carbon tetrachloride	0.050	N.D.
Chlorobenzene	0.050	N.D.
Chloroethane	0.050	N.D.
Chloroform	0.050	N.D.
Chloromethane	0.050	N.D.
Dibromochloromethane	0.050	N.D.
1,2-Dichlorobenzene	0.050	N.D.
1,3-Dichlorobenzene	0.050	N.D.
1,4-Dichlorobenzene	0.050	N.D.
1,1-Dichloroethane	0.050	N.D.
1,2-Dichloroethane	0.050	N.D.
1,1-Dichloroethene	0.050	N.D.
cis 1,2-Dichloroethene	0.050	N.D.
trans 1,2-Dichloroethene	0.050	N.D.
1,2-Dichloropropane	0.050	N.D.
cis-1,3-Dichloropropene	0.050	N.D.
trans-1,3-Dichloropropene	0.050	N.D.
Methylene chloride	0.25	N.D.
1,1,2,2-Tetrachloroethane	0.050	N.D.
Tetrachloroethene	**0.050**	**0.62**
1,1,1-Trichloroethane	0.050	N.D.
1,1,2-Trichloroethane	0.050	N.D.
Trichloroethene	0.050	N.D.
Trichlorofluoromethane	0.050	N.D.
Vinyl chloride	0.050	N.D.

4-Bromofluorobenzene Surrogate Recovery 86
Surrogate Recovery Control Limits are 32 - 148 %.
The results reported above are on a dry weight basis.
Analytes reported as N.D. were not detected above the stated Reporting Limit.

NORTH CREEK ANALYTICAL Inc.

Scott L. Armand
Laboratory Manager

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Bovay Northwest, Inc.	Client Project ID:	DOE-UST, #1641-031	Sampled:	Oct 28, 1994
808 East Sprague Avenue	Sample Descript:	Soil, #1171-5-10	Received:	Nov 1, 1994
Spokane, WA 98202	Analysis Method:	EPA 8010	Analyzed:	Nov 1, 1994
Attention: Nancy Lucas	Sample Number:	411-0001	Reported:	Nov 2, 1994

HALOGENATED VOLATILE ORGANICS

Analyte	Reporting Limit mg/kg (ppm)	Sample Results mg/kg (ppm)
Bromodichloromethane	0.050	N.D.
Bromoform	0.050	N.D.
Bromomethane	0.050	N.D.
Carbon tetrachloride	0.050	N.D.
Chlorobenzene	0.050	N.D.
Chloroethane	0.050	N.D.
Chloroform	0.050	N.D.
Chloromethane	0.050	N.D.
Dibromochloromethane	0.050	N.D.
1,2-Dichlorobenzene	0.050	N.D.
1,3-Dichlorobenzene	0.050	N.D.
1,4-Dichlorobenzene	0.050	N.D.
1,1-Dichloroethane	0.050	N.D.
1,2-Dichloroethane	0.050	N.D.
1,1-Dichloroethene	0.050	N.D.
cis 1,2-Dichloroethene	0.050	N.D.
trans 1,2-Dichloroethene	0.050	N.D.
1,2-Dichloropropane	0.050	N.D.
cis-1,3-Dichloropropene	0.050	N.D.
trans-1,3-Dichloropropene	0.050	N.D.
Methylene chloride	0.25	N.D.
1,1,2,2-Tetrachloroethane	0.050	N.D.
Tetrachloroethene	0.050	0.28
1,1,1-Trichloroethane	0.050	N.D.
1,1,2-Trichloroethane	0.050	N.D.
Trichloroethene	0.050	N.D.
Trichlorofluoromethane	0.050	N.D.
Vinyl chloride	0.050	N.D.

4-Bromofluorobenzene Surrogate Recovery, %: 88
Surrogate Recovery Control Limits are 32 - 148 %.
The results reported above are on a dry weight basis.
Analytes reported as N.D. were not detected above the stated Reporting Limit.

NORTH CREEK ANALYTICAL Inc.

Laura Dutton

Laura Dutton
Project Manager

NORTH CREEK ANALYTICAL

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Bovay Northwest Inc. - Richland	Client Project ID:	DOE-UST, #1641-031	Sampled:	Oct 31, 1994
660 Swift, Suite D	Sample Descript:	Soil, 1171-5-11	Received:	Nov 1, 1994
Richland, WA 99352	Analysis Method:	EPA 8010	Analyzed:	Nov 2, 1994
Attention: Jim Rouse	Sample Number:	411-4007	Reported:	Nov 3, 1994

HALOGENATED VOLATILE ORGANICS

Analyte	Reporting Limit mg/kg (ppm)	Sample Results mg/kg (ppm)
Bromodichloromethane	0.050	N.D.
Bromoform	0.050	N.D.
Bromomethane	0.050	N.D.
Carbon tetrachloride	0.050	N.D.
Chlorobenzene	0.050	N.D.
Chloroethane	0.050	N.D.
Chloroform	0.050	N.D.
Chloromethane	0.050	N.D.
Dibromochloromethane	0.050	N.D.
1,2-Dichlorobenzene	0.050	N.D.
1,3-Dichlorobenzene	0.050	N.D.
1,4-Dichlorobenzene	0.050	N.D.
1,1-Dichloroethane	0.050	N.D.
1,2-Dichloroethane	0.050	N.D.
1,1-Dichloroethene	0.050	N.D.
cis 1,2-Dichloroethene	0.050	N.D.
trans 1,2-Dichloroethene	0.050	N.D.
1,2-Dichloropropane	0.050	N.D.
cis-1,3-Dichloropropene	0.050	N.D.
trans-1,3-Dichloropropene	0.050	N.D.
Methylene chloride	0.25	N.D.
1,1,2,2-Tetrachloroethane	0.050	N.D.
Tetrachloroethene	0.050	N.D.
1,1,1-Trichloroethane	0.050	N.D.
1,1,2-Trichloroethane	0.050	N.D.
Trichloroethene	0.050	N.D.
Trichlorofluoromethane	0.050	N.D.
Vinyl chloride	0.050	N.D.

4-Bromofluorobenzene Surrogate Recovery, %: 94
Surrogate Recovery Control Limits are 32 - 148 %.
The results reported above are on a dry weight basis.
Analytes reported as N.D. were not detected above the stated Reporting Limit.

NORTH CREEK ANALYTICAL Inc.

Scott L. Armand
Laboratory Manager

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Bovay Northwest Inc. - Richland	Client Project ID:	DOE - UST, 1641-031		
660 Swift, Suite D	Sample Matrix:	Soil		
Richland, WA 99352			Received:	Oct 27, 1994
Attention: Jim Rouse	First Sample #:	410-4618	Reported:	Oct.27/Nov.1,1994

TOTAL SOLIDS & MOISTURE CONTENT REPORT

Sample Number	Sample Description	Total Solids %	Moisture Content %
410-4618	1171-5-1	93	6.9
410-4619	1171-5-2	95	5.4
410-4620	1171-5-3	95	5.4
410-4621	1171-5-4	93	7.4
410-4622	1171-5-5	92	8.2
410-4623	1171-5-6	92	7.7
410-4624	1171-5-7	93	6.6
410-4669	1171-5-8	92	7.6
410-4670	1171-5-9	93	6.7

The enclosed analytical results for soils, sediments and sludges have been converted to a DRY WEIGHT reporting basis.
To attain the wet weight "as received" equivalent, multiply the dry weight result by the decimal fraction of percent Total Solids.
The results in this report apply to the samples analyzed in accordance with the chain of custody document.
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Scott L. Armand
Laboratory Manager

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Bovay Northwest, Inc.	Client Project ID:	DOE-UST, #1641-031		
808 East Sprague Avenue	Sample Matrix:	Soil		
Spokane, WA 98202			Received:	Nov 1, 1994
Attention: Nancy Lucas	First Sample #:	411-0001	Reported:	Nov 1, 1994

TOTAL SOLIDS & MOISTURE CONTENT REPORT

Sample Number	Sample Description	Total Solids %	Moisture Content %
411-0001	#1171-5-10	91	9.0

The enclosed analytical results for soils, sediments and sludges have been converted to a DRY WEIGHT reporting basis.
To attain the wet weight "as received" equivalent, multiply the dry weight result by the decimal fraction of percent Total Solids.
The results in this report apply to the samples analyzed in accordance with the chain of custody document.
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Laura Dutton

Laura Dutton
Project Manager

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Bovay Northwest Inc.	Client Project ID:	DOE-UST, #1641-031	
808 E. Sprague	Sample Matrix:	Soil	
Spokane, WA 99202			Received: Nov 1, 1994
Attention: Jim Rouse	First Sample #:	411-4007	Reported: Nov 2, 1994

TOTAL SOLIDS & MOISTURE CONTENT REPORT

Sample Number	Sample Description	Total Solids %	Moisture Content %
411-4007	1171-5-11	95	5.5
411-4008	1171-5-13	96	4.3
411-4009	1171-5-14	94	6.1

The enclosed analytical results for soils, sediments and sludges have been converted to a DRY WEIGHT reporting basis.
To attain the wet weight "as received" equivalent, multiply the dry weight result by the decimal fraction of percent Total Solids.
The results in this report apply to the samples analyzed in accordance with the chain of custody document.
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Scott L. Armand
Laboratory Manager

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Bovay Northwest, Inc.	Client Project ID: DOE-UST, #1641-031	Analyst:	J. Cooper
808 East Sprague Avenue	Sample Matrix: Soil		
Spokane, WA 98202	Analysis Method: WTPH-418.1 Modified	Extracted:	Nov 1, 1994
Attention: Nancy Lucas	Units: mg/kg (ppm)	Analyzed:	Nov 1, 1994
		Reported:	Nov 1, 1994

HYDROCARBON QUALITY CONTROL DATA REPORT

ACCURACY ASSESSMENT
Laboratory Control Sample

Petroleum Oil	
Spike Conc. Added:	166
Spike Result:	200
% Recovery:	121
Upper Control Limit %:	157
Lower Control Limit %:	69

PRECISION ASSESSMENT
Sample Duplicate

Petroleum Oil	
Sample Number:	411-0001
Original Result:	14,000
Duplicate Result:	15,000
Relative % Difference	7.4
Maximum RPD:	60

NORTH CREEK ANALYTICAL Inc.

Laura Dutton
Project Manager

% Recovery: $\frac{\text{Spike Result}}{\text{Spike Concentration Added}} \times 100$

Relative % Difference: $\frac{\text{Original Result - Duplicate Result}}{(\text{Original Result + Duplicate Result}) / 2} \times 100$

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Bovay Northwest Inc. - Richland	Client Project ID: DOE-UST, #1641-031	Analyst:	J. Cooper
660 Swift, Suite D	Sample Matrix: Soil		
Richland, WA 99352	Analysis Method: WTPH-418.1 Modified	Extracted:	Nov 2, 1994
Attention: Jim Rouse	Units: mg/kg (ppm)	Analyzed:	Nov 2, 1994
		Reported:	Nov 2, 1994

HYDROCARBON QUALITY CONTROL DATA REPORT

ACCURACY ASSESSMENT
Laboratory Control Sample

Petroleum Oil	
Spike Conc. Added:	166
Spike Result:	207
% Recovery:	124
Upper Control Limit %:	157
Lower Control Limit %:	69

PRECISION ASSESSMENT
Sample Duplicate

Petroleum Oil	
Sample Number:	411-4009
Original Result:	N.D.
Duplicate Result:	N.D.
Relative % Difference	Relative Percent Difference values are not reported at sample concentration levels less than 10 times the Detection Limit.
Maximum RPD:	60

NORTH CREEK ANALYTICAL Inc.

Scott L. Armand
Laboratory Manager

$$\text{\% Recovery:} \quad \frac{\text{Spike Result}}{\text{Spike Concentration Added}} \times 100$$

$$\text{Relative \% Difference:} \quad \frac{\text{Original Result - Duplicate Result}}{(\text{Original Result + Duplicate Result}) / 2} \times 100$$

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Bovay Northwest Inc. - Richland	Client Project ID:	DOE-UST, #1641-031		
660 Swift, Suite D	Sample Descript:	Soil, Method Blank		
Richland, WA 99352	Analysis Method:	EPA 8010	Analyzed:	Nov 1, 1994
Attention: Jim Rouse	Sample Number:	BLK41101	Reported:	Nov 3, 1994

HALOGENATED VOLATILE ORGANICS

Analyte	Reporting Limit mg/kg (ppm)	Sample Results mg/kg (ppm)
Bromodichloromethane	0.050	N.D.
Bromoform	0.050	N.D.
Bromomethane	0.050	N.D.
Carbon tetrachloride	0.050	N.D.
Chlorobenzene	0.050	N.D.
Chloroethane	0.050	N.D.
Chloroform	0.050	N.D.
Chloromethane	0.050	N.D.
Dibromochloromethane	0.050	N.D.
1,2-Dichlorobenzene	0.050	N.D.
1,3-Dichlorobenzene	0.050	N.D.
1,4-Dichlorobenzene	0.050	N.D.
1,1-Dichloroethane	0.050	N.D.
1,2-Dichloroethane	0.050	N.D.
1,1-Dichloroethene	0.050	N.D.
cis 1,2-Dichloroethene	0.050	N.D.
trans 1,2-Dichloroethene	0.050	N.D.
1,2-Dichloropropane	0.050	N.D.
cis-1,3-Dichloropropene	0.050	N.D.
trans-1,3-Dichloropropene	0.050	N.D.
Methylene chloride	0.25	N.D.
1,1,2,2-Tetrachloroethane	0.050	N.D.
Tetrachloroethene	0.050	N.D.
1,1,1-Trichloroethane	0.050	N.D.
1,1,2-Trichloroethane	0.050	N.D.
Trichloroethene	0.050	N.D.
Trichlorofluoromethane	0.050	N.D.
Vinyl chloride	0.050	N.D.

4-Bromofluorobenzene Surrogate Recovery, %: 85
Surrogate Recovery Control Limits are 32 - 148 %.
The results reported above are on a dry weight basis.
Analytes reported as N.D. were not detected above the stated Reporting Limit.

NORTH CREEK ANALYTICAL Inc.

Scott L. Armand
Laboratory Manager

NORTH CREEK ANALYTICAL

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9405 S.W. Nimbus Avenue • Beaverton, OR 97008-7132 (503) 643-9200 • FAX 644-2202

Bovay Northwest, Inc.	Client Project ID:	DOE-UST, #1641-031		
808 East Sprague Avenue	Sample Descript:	Method Blank		
Spokane, WA 98202	Analysis Method:	EPA 8010	Analyzed:	Nov 1, 1994
Attention: Nancy Lucas	Sample Number:	BLK110194	Reported:	Nov 2, 1994

HALOGENATED VOLATILE ORGANICS

Analyte	Reporting Limit mg/kg (ppm)	Sample Results mg/kg (ppm)
Bromodichloromethane	0.050	N.D.
Bromoform	0.050	N.D.
Bromomethane	0.050	N.D.
Carbon tetrachloride	0.050	N.D.
Chlorobenzene	0.050	N.D.
Chloroethane	0.050	N.D.
Chloroform	0.050	N.D.
Chloromethane	0.050	N.D.
Dibromochloromethane	0.050	N.D.
1,2-Dichlorobenzene	0.050	N.D.
1,3-Dichlorobenzene	0.050	N.D.
1,4-Dichlorobenzene	0.050	N.D.
1,1-Dichloroethane	0.050	N.D.
1,2-Dichloroethane	0.050	N.D.
1,1-Dichloroethene	0.050	N.D.
cis 1,2-Dichloroethene	0.050	N.D.
trans 1,2-Dichloroethene	0.050	N.D.
1,2-Dichloropropane	0.050	N.D.
cis-1,3-Dichloropropene	0.050	N.D.
trans-1,3-Dichloropropene	0.050	N.D.
Methylene chloride	0.25	N.D.
1,1,2,2-Tetrachloroethane	0.050	N.D.
Tetrachloroethene	0.050	N.D.
1,1,1-Trichloroethane	0.050	N.D.
1,1,2-Trichloroethane	0.050	N.D.
Trichloroethene	0.050	N.D.
Trichlorofluoromethane	0.050	N.D.
Vinyl chloride	0.050	N.D.

4-Bromofluorobenzene Surrogate Recovery, %: 85
Surrogate Recovery Control Limits are 32 - 148 %.
The results reported above are on a dry weight basis.
Analytes reported as N.D. were not detected above the stated Reporting Limit.

NORTH CREEK ANALYTICAL Inc.

Laura Dutton
Project Manager

NORTH CREEK ANALYTICAL

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Bovay Northwest Inc. - Richland	Client Project ID:	DOE - UST, 1641-031	
660 Swift, Suite D	Sample Descript:	Soil, Method Blank	
Richland, WA 99352	Analysis Method:	EPA 8010	Analyzed: Oct 31, 1994
Attention: Jim Rouse	Sample Number:	BLK41031	Reported: Nov 1, 1994

HALOGENATED VOLATILE ORGANICS

Analyte	Reporting Limit mg/kg (ppm)	Sample Results mg/kg (ppm)
Bromodichloromethane	0.050	N.D.
Bromoform	0.050	N.D.
Bromomethane	0.050	N.D.
Carbon tetrachloride	0.050	N.D.
Chlorobenzene	0.050	N.D.
Chloroethane	0.050	N.D.
Chloroform	0.050	N.D.
Chloromethane	0.050	N.D.
Dibromochloromethane	0.050	N.D.
1,2-Dichlorobenzene	0.050	N.D.
1,3-Dichlorobenzene	0.050	N.D.
1,4-Dichlorobenzene	0.050	N.D.
1,1-Dichloroethane	0.050	N.D.
1,2-Dichloroethane	0.050	N.D.
1,1-Dichloroethene	0.050	N.D.
cis 1,2-Dichloroethene	0.050	N.D.
trans 1,2-Dichloroethene	0.050	N.D.
1,2-Dichloropropane	0.050	N.D.
cis-1,3-Dichloropropene	0.050	N.D.
trans-1,3-Dichloropropene	0.050	N.D.
Methylene chloride	0.25	N.D.
1,1,2,2-Tetrachloroethane	0.050	N.D.
Tetrachloroethene	0.050	N.D.
1,1,1-Trichloroethane	0.050	N.D.
1,1,2-Trichloroethane	0.050	N.D.
Trichloroethene	0.050	N.D.
Trichlorofluoromethane	0.050	N.D.
Vinyl chloride	0.050	N.D.

4-Bromofluorobenzene Surrogate Recovery 103
Surrogate Recovery Control Limits are 32 - 148 %.
The results reported above are on a dry weight basis.
Analytes reported as N.D. were not detected above the stated Reporting Limit.

NORTH CREEK ANALYTICAL Inc.

Scott L. Armand
Laboratory Manager

NORTH CREEK ANALYTICAL

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Bovay Northwest, Inc.	Client Project ID: DOE-UST, #1641-031	Analyst:	R. Lister
808 East Sprague Avenue	Sample Matrix: Soil		
Spokane, WA 98202	Analysis Method: EPA 8010		
Attention: Nancy Lucas	Units: mg/kg (ppm)	Analyzed:	Nov 1, 1994
	QC Sample #: 411-0001	Reported:	Nov 2, 1994

MATRIX SPIKE QUALITY CONTROL DATA REPORT

ANALYTE	1,1-DCE	TCE	Chloro-Benzene
Sample Result:	N.D.	N.D.	N.D.
Spike Conc. Added:	1.10	1.10	1.10
Spike Result:	1.00	0.77	0.84
Spike % Recovery:	91%	70%	76%
Spike Dup. Result:	1.02	0.87	1.00
Spike Duplicate % Recovery:	93%	79%	91%
Upper Control Limit %:	115	102	113
Lower Control Limit %:	31	46	54
Relative % Difference:	2.0%	12%	19%
Maximum RPD:	20	21	22

NORTH CREEK ANALYTICAL Inc.

Laura Dutton
Project Manager

% Recovery:	$\frac{\text{Spike Result - Sample Result}}{\text{Spike Conc. Added}}$	x 100
Relative % Difference:	$\frac{\text{Spike Result - Spike Dup. Result}}{\text{(Spike Result + Spike Dup. Result) / 2}}$	x 100

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Bovay Northwest Inc. - Richland
660 Swift, Suite D
Richland, WA 99352
Attention: Jim Rouse

Client Project ID: DOE-UST, #1641-031
Sample Matrix: Soil
Analysis Method: EPA 8010
Units: mg/kg (ppm)
QC Sample #: 411-0001

Analyst: R. Lister
Analyzed: Nov 1, 1994
Reported: Nov 3, 1994

MATRIX SPIKE QUALITY CONTROL DATA REPORT

ANALYTE	1,1-DCE	TCE	Chloro-Benzene
Sample Result:	N.D.	N.D.	N.D.
Spike Conc. Added:	1.1	1.1	1.1
Spike Result:	1	0.77	0.84
Spike % Recovery:	91%	70%	76%
Spike Dup. Result:	1.02	0.87	1
Spike Duplicate % Recovery:	93%	79%	91%
Upper Control Limit %:	115	102	113
Lower Control Limit %:	31	46	54
Relative % Difference:	2.0%	12.2%	17.4%
Maximum RPD:	20	21	22

NORTH CREEK ANALYTICAL Inc.

Scott L. Armand
Laboratory Manager

$$\text{\% Recovery:} \quad \frac{\text{Spike Result - Sample Result}}{\text{Spike Conc. Added}} \times 100$$

$$\text{Relative \% Difference:} \quad \frac{\text{Spike Result - Spike Dup. Result}}{\text{(Spike Result + Spike Dup. Result) / 2}} \times 100$$

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Bovay Northwest Inc. - Richland
660 Swift, Suite D
Richland, WA 99352
Attention: Jim Rouse

Client Project ID: DOE - UST, 1641-031
Sample Matrix: Soil
Analysis Method: EPA 8010
Units: mg/kg (ppm)
QC Sample #: BLK41031

Analyst: R. Lister
Analyzed: Oct 31, 1994
Reported: Nov 1, 1994

BLANK SPIKE QUALITY CONTROL DATA REPORT

ANALYTE	1,1-DCE	TCE	Chloro-Benzene
Sample Result:	N.D.	N.D.	N.D.
Spike Conc. Added:	1	1	1
Spike Result:	0.88	1	0.9
Spike % Recovery:	88%	100%	90%
Spike Dup. Result:	0.82	0.97	0.89
Spike Duplicate % Recovery:	82%	97%	89%
Upper Control Limit %:	115	102	113
Lower Control Limit %:	31	46	54
Relative % Difference:	7.1%	3.0%	1.1%
Maximum RPD:	20	21	22

NORTH CREEK ANALYTICAL Inc.

Scott L. Armand
Laboratory Manager

% Recovery: $\frac{\text{Spike Result - Sample Result}}{\text{Spike Conc. Added}} \times 100$

Relative % Difference: $\frac{\text{Spike Result - Spike Dup. Result}}{\text{(Spike Result + Spike Dup. Result) / 2}} \times 100$

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Bovay Northwest, Inc.
808 East Sprague Avenue
Spokane, WA 98202
Attention: Nancy Lucas

Client Project ID: DOE-UST, #1641-031
Sample Matrix : Soil
Units: mg/kg (ppm)

Analyst: T. Fitzgibbon, A. Shephard
Digested: Nov 1, 1994
Reported: Nov 1, 1994

METALS QUALITY CONTROL DATA REPORT

ANALYTE	As	Cd	Cr	Pb
EPA Method:	6010	6010	6010	6010
Date Analyzed:	Nov 1, 1994	Nov 1, 1994	Nov 1, 1994	Nov 1, 1994
ACCURACY ASSESSMENT				
LCS Spike Conc. Added:	50	50	50	50
LCS Spike Result:	42	34	37	34
LCS Spike % Recovery:	84	68	74	68
Upper Control Limit:	122	110	117	114
Lower Control Limit:	63	65	61	55
Matrix Spike Sample #:	410-4618	410-4618	410-4618	410-4618
Matrix Spike % Recovery:	59	61	62	56
PRECISION ASSESSMENT				
Sample #:	410-4618	410-4618	410-4618	410-4618
Original:	N.D.	N.D.	5.1	7.8
Duplicate:	N.D.	N.D.	6.6	9.1
Relative % Difference:	Q-5	Q-5	26	Q-5

NORTH CREEK ANALYTICAL Inc.

Laura Dutton
Project Manager

Please Note:
Q-5 = RPD values are not reported at sample concentrations < 10 X the Reporting Limit.

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Bovay Northwest Inc. - Richland
660 Swift, Suite D
Richland, WA 99352
Attention: Jim Rouse

Client Project ID: DOE - UST, 1641-031
Sample Matrix : Soil
Units: mg/kg (ppm)

Analyst: T. Fitzgibbon, B. Oaks
Digested: Nov 1, 1994
Reported: Nov 10, 1994

METALS QUALITY CONTROL DATA REPORT

ANALYTE	Arsenic	Cadmium	Chromium	Lead
EPA Method:	6010	6010	6010	6010
Date Analyzed:	Nov 1, 1994	Nov 1, 1994	Nov 1, 1994	Nov 1, 1994
ACCURACY ASSESSMENT				
LCS Spike Conc. Added:	50	50	50	50
LCS Spike Result:	42	34	37	34
LCS Spike % Recovery:	84	68	74	68
Upper Control Limit:	122	110	117	114
Lower Control Limit:	63	65	61	55
Matrix Spike Sample #:	410-4618	410-4618	410-4618	410-4618
Matrix Spike % Recovery:	59	61	62	56
PRECISION ASSESSMENT				
Sample #:	410-4618	410-4618	410-4618	410-4618
Original:	N.D.	N.D.	5.1	7.8
Duplicate:	N.D.	N.D.	6.6	9.1
Relative % Difference:	Q-5	Q-5	26	Q-5

NORTH CREEK ANALYTICAL Inc.

Please Note:
Q-5 = RPD values are not reported at sample concentrations < 10 X the Reporting Limit.

Scott L. Armand
Laboratory Manager

4104618.BOR <8>

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Bovay Northwest Inc. - Richland
660 Swift, Suite D
Richland, WA 99352
Attention: Jim Rouse

Client Project ID: DOE-UST, #1641-031
Sample Matrix : Soil
Units: mg/kg (ppm)

Analyst: T. Fitzgibbon

Digested: Nov 2, 1994
Reported: Nov 2, 1994

METALS QUALITY CONTROL DATA REPORT

ANALYTE	Arsenic	Cadmium	Chromium	Lead
EPA Method:	6010	6010	6010	6010
Date Analyzed:	Nov 2, 1994	Nov 2, 1994	Nov 2, 1994	Nov 2, 1994
ACCURACY ASSESSMENT				
LCS Spike Conc. Added:	50	50	50	50
LCS Spike Result:	38	33	34	33
LCS Spike % Recovery:	76	66	68	66
Upper Control Limit:	122	110	117	114
Lower Control Limit:	63	65	61	55
Matrix Spike Sample #:	411-4007	411-4007	411-4007	411-4007
Matrix Spike % Recovery:	61	56	53	59
PRECISION ASSESSMENT				
Sample #:	411-4007	411-4007	411-4007	411-4007
Original:	N.D.	N.D	5.5	N.D.
Duplicate:	N.D.	N.D.	5.4	N.D.
Relative % Difference:	RPD values are not reported at sample concentration levels < 10 X the Reporting Limit.			

NORTH CREEK ANALYTICAL Inc.

Scott L. Armand
Laboratory Manager

Lab Control Sample % Recovery: $\frac{\text{Conc. of L.C.S.}}{\text{L.C.S. Spike Conc. Added}} \times 100$

Relative % Difference: $\frac{\text{Original Result - Duplicate Result}}{(\text{Original Result + Duplicate Result}) / 2} \times 100$

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Bovay Northwest Inc. - Richland	Client Project ID:	DOE - UST, 1641-031	
660 Swift, Suite D	Sample Descript:	Method Blank	
Richland, WA 99352	Sample Matrix:	Soil	Digested: Nov 1, 1994
Attention: Jim Rouse	Sample Number:	BLK41101	Analyzed: Nov 1, 1994
			Reported: Nov 1, 1994

METALS ANALYSIS

Analyte	EPA Method	Reporting Limit mg/kg (ppm)	Sample Results mg/kg (ppm)
Arsenic	6010	10.0	N.D.
Cadmium	6010	0.25	N.D.
Chromium	6010	0.5	N.D.
Lead	6010	5.0	N.D.

Analytes reported as N.D. were not detected above the stated Reporting Limit.
The results reported above are on a dry weight basis.

NORTH CREEK ANALYTICAL Inc.

Scott L. Armand
Laboratory Manager

4104618.BOR <7>

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Bovay Northwest, Inc.	Client Project ID:	DOE-UST, #1641-031	
808 East Sprague Avenue	Sample Descript:	Method Blank	
Spokane, WA 98202	Sample Matrix:	Soil	Digested: Nov 1, 1994
Attention: Nancy Lucas	Sample Number:	BLK110194	Analyzed: Nov 1, 1994
			Reported: Nov 1, 1994

METALS ANALYSIS

Analyte	EPA Method	Reporting Limit mg/kg (ppm)	Sample Results mg/kg (ppm)
Arsenic	6010	10	N.D.
Cadmium	6010	0.25	N.D.
Chromium	6010	0.50	N.D.
Lead	6010	5.0	N.D.

Analytes reported as N.D. were not detected above the stated Reporting Limit.
The results reported above are on a dry weight basis.

NORTH CREEK ANALYTICAL Inc.

Laura Dutton

Laura Dutton
Project Manager

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Bovay Northwest Inc. - Richland	Client Project ID:	DOE-UST, #1641-031		
660 Swift, Suite D	Sample Descript:	Method Blank		
Richland, WA 99352	Sample Matrix:	Soil	Digested:	Nov 2, 1994
Attention: Jim Rouse	Sample Number:	BLK	Analyzed:	Nov 2, 1994
			Reported:	Nov 2, 1994

METALS ANALYSIS

Analyte	EPA Method	Reporting Limit mg/kg (ppm)	Sample Results mg/kg (ppm)
Arsenic	6010	10.0	N.D.
Cadmium	6010	0.25	N.D.
Chromium	6010	0.5	N.D.
Lead	6010	5.0	N.D.

Analytes reported as N.D. were not detected above the stated Reporting Limit.
The results reported above are on a dry weight basis.

NORTH CREEK ANALYTICAL Inc.

Scott L. Armand
Laboratory Manager

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X

CHAIN OF CUSTODY REPORT

Site Characterization Report for the USDOE UST 1171-5

CLIENT: Bovay Northwest
ADDRESS: 808 E. Sprague Ave. Spokane, Wa. 98202
PHONE: 838-4111 FAX: 747-8537

REPORT TO: Nancy Lucas, Jim Rouse
BILLING TO: Bovay N.W.
P.O. NUMBER:
NCA QUOTE #: SQ410130

PROJECT NAME: DOE - UST
PROJECT NUMBER: 1641-031
SAMPLED BY: Jim Rouse

SAME DAY RUSH	(+150%)
NEXT BUSINESS DAY RUSH	(+100%)
2 BUSINESS DAY RUSH	(+80%)
3 BUSINESS DAY RUSH	(+60%)
5 BUSINESS DAY RUSH	(+40%)
10 BUSINESS DAY STANDARD	(LIST PRICE)
5 BUS. DAY HYDROCARBONS	(LIST PRICE)

SAMPLE IDENTIFICATION: (NUMBER OR DESCRIPTION)	SAMPLING DATE / TIME	MATRIX (W,S,O)	# OF CONT.	Analysis Request: 418.1	As, Cd, Cr, Pb 6010	COMMENTS & PRESERVATIVES USED	NORTH CREEK SAMPLE NUMBER
1. 1171-5-1	10/24/94/1445	S	1	X	X X		410-4618
2. 1171-5-2	10/27/94/920	S	1	X			410-4619
3. 1171-5-3	10/27/94/925	S	1	X			410-4620
4. 1171-5-4	10/27/94/930	S	1	X			410-4621
5. 1171-5-5	10/27/94/935	S	1	X			410-4622
6. 1171-5-6	10/27/94/1345	S	1	X			410-4623
7. 1171-5-7	10/27/94/1510	S	1	X			410-4624
8. 1171-5-8	10/27/94/1520	S	1	X			410-~~4625~~ 4669
9. 1171-5-9	10/27/94/1530	S	1	X			410-~~4626~~ 4670
10.							

RELINQUISHED BY: Jim Rouse DATE: 10/27/94
FIRM: Bovay N.W. TIME: 1615

RECEIVED BY: 4784873015 DATE: 10/27/94
FIRM: Airborne Express TIME: 1615

RELINQUISHED BY: DATE:
FIRM: TIME:

RECEIVED BY: Scott 24 DATE: 10-28-94
FIRM: NCA TIME: 1100

ADDITIONAL REMARKS:

PAGE 1 OF 1

NORTH CREEK ANALYTICAL

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15055 S.W. Sequoia Parkway, Suite 110, Portland, OR 97224-7155 (503) 624-9800 FAX 684-3782

X

CHAIN OF CUSTODY REPORT

CLIENT: Bovay Northwest
ADDRESS: 808 E. Sprague Ave. Spokane, WA. 99202
PHONE: (509) 926-6226 FAX: (509) 926-8711
PROJECT NAME: DOE-UST
PROJECT NUMBER: 1641-031
SAMPLED BY: Jim Rouse

REPORT TO: Jim Rouse, Nancy Lucas
BILLING TO: Bovay NW
P.O. NUMBER: 1641-031
NCA QUOTE #:

SAME DAY RUSH	(+150%)	X
NEXT BUSINESS DAY RUSH	(+100%)	
2 BUSINESS DAY RUSH	(+80%)	
3 BUSINESS DAY RUSH	(+60%)	
5 BUSINESS DAY RUSH	(+40%)	
10 BUSINESS DAY STANDARD	(LIST PRICE)	
5 BUS. DAY HYDROCARBONS	(LIST PRICE)	

SAMPLE IDENTIFICATION: (NUMBER OR DESCRIPTION)	SAMPLING DATE / TIME	MATRIX (W,S,O)	# OF CONT.	Analysis Request: WTPH-418.1	As, Cd, Cr, Pb 8010	COMMENTS & PRESERVATIVES USED	NORTH CREEK SAMPLE NUMBER
1. 1171-5-10	10/28/94 1130	S	1	X	X		411000
2.							
3.							
4.							
5.							
6.							
7.							
8.							
9.							
10.							

RELINQUISHED BY: Jim Rouse DATE: 10/28/94
FIRM: Bovay NW TIME: 1545
RELINQUISHED BY: DATE:
FIRM: TIME:
ADDITIONAL REMARKS:

RECEIVED BY: Airborne Express DATE: 10/28/94
FIRM: 264-590-7412 TIME: 1600
RECEIVED BY: DATE: 11/1/94
FIRM: NA TIME: 0845

PAGE 1 OF 1

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CHAIN OF CUSTODY REPORT

CLIENT: Bovay NW
ADDRESS: 808 E. Sprague Ave. Spokane, Wa. 98202
PHONE: (509) 946-1270 FAX: (509) 946-8611
PROJECT NAME: DOE-UST
PROJECT NUMBER: 1641-031
SAMPLED BY: Jim Rouse

REPORT TO: Jim Rouse
BILLING TO: Bovay NW
P.O. NUMBER: 1641-031
NCA QUOTE #: 9PA11003

Turnaround		
SAME DAY RUSH	(+150%)	~~X~~
NEXT BUSINESS DAY RUSH	(+100%)	X
2 BUSINESS DAY RUSH	(+80%)	
3 BUSINESS DAY RUSH	(+60%)	
5 BUSINESS DAY RUSH	(+40%)	
10 BUSINESS DAY STANDARD	(LIST PRICE)	
5 BUS. DAY HYDROCARBONS	(LIST PRICE)	

Analysis Request: WTPH-418.1; As, Cd, [illegible]; 8010

SAMPLE IDENTIFICATION: (NUMBER OR DESCRIPTION)	SAMPLING DATE / TIME	MATRIX (W,S,O)	# OF CONT.	WTPH-418.1	As, Cd, [illegible]	8010	COMMENTS & PRESERVATIVES USED	NORTH CREEK SAMPLE NUMBER
1. 1171-5-11	10/31/94 / 1135	S	1	X	X	X		411-4007
2. 1171-5-12	10/31/94 / 1137	S	1	X	→	→	(BROKEN UPON ARRIVAL)	
3. 1171-5-13	10/31/94 / 1140	S	1	X	X	X		411-4008
4. 1171-5-14	10/31/94 / 1145	S	1	X				411-4009
5.								
6.								
7.								
8.								
9.								
10.								

(Rows 5–10 crossed out: JWR 10/31/94)

RELINQUISHED BY: Jim Rouse DATE: 10/31/94
FIRM: Bovay NW TIME: 1600
RECEIVED BY: Airborne Express DATE: 10/31/94
FIRM: 478-487-3111 TIME: 1600

RELINQUISHED BY: DATE:
FIRM: TIME:
RECEIVED BY: Kim Morley DATE: 11-1-94
FIRM: NCA-S TIME: 3:00 pm

ADDITIONAL REMARKS:

PAGE 1 OF 1